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ABSTRACT

This survey of scientific literature briefly overviews findings on the relations between learning and behavior and hunger, undernutrition, and malnutrition. Topics examined include chronic undernutrition in the U.S., iron deficiency, obesity, and hyperactivity. School feeding programs, including school breakfast programs, are described. The list of references cites 92 items. (RH)

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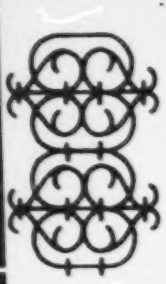

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RELATIONSHIPS OF HUNGER AND MALNUTRITION TO LEARNING ABILITY AND BEHAVIOR

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INTRODUCTION

In 1973, the Florida Department of Citrus published the first comprehensive survey of scientific literature dealing with the relationships between learning and hunger, undernutrition and malnutrition. The response to this Monograph was unprecedented as requests for the publication outnumbered those for all other DOC nutrition information materials.

Since then, new studies have brought additional facts to light. And, although research in this area is far from complete, the findings and developments that have occurred in four years' time have been significant enough to warrant the publication of a second, updated edition of the Monograph.

The complex socio-health problems of malnutrition and hunger, generally considered unique to developing countries, have received renewed interest in the United States. In 1967, several reports of undernutrition among the poor in America came into public focus. Both politicians and citizens reacted to these reports. One of the initial events in stimulating renewed interest and concern was a 1967 report by the Field Foundation team which had investigated the health of Head Start preschool children in Mississippi.[1] The report documented not only extreme poverty in the area but also the hunger and malnutrition associated with it. Further reports of undernutrition were forthcoming. Some unpublished data as well as the final report of the public hearings held by the Citizens' Board of Inquiry into Hunger and Malnutrition in the U.S. were published in *HUNGER, U.S.A.* in 1968.[2] A television documentary, *HUNGER IN AMERICA*, based on the public hearings of the Citizen's Board of Inquiry was aired by the Columbia Broadcasting System in May of 1968.[3] These reports indicated that children, especially those from socio-economically disadvantaged areas, were at the highest risk of suffering from possible malnutrition and hunger.

Concurrently, accumulating evidence from developing countries indicated an association between severe malnutrition and impaired mental function.[4,5,6,7] The effect of less severe malnutrition on mental development was not as well understood or documented during this period. However, a number of reports from school teachers and administrators about students arriving at school hungry and the possible implications of this situation on learning were beginning to generate concern.[8]

Many organizations and individuals have assisted in the development of this new edition. We give special thanks to the Society of Nutrition Education, the American School Food Service Association and the United States Department of Health, Education & Welfare.

Additionally, we acknowledge the contributions of educators and nutrition leaders such as Dr. Paul Briggs, Superintendent, Cleveland Public Schools; Dr. Arnold Schaefer, Executive Director, Swanson Center for Nutrition, Inc., Omaha; Dr. George Briggs, Professor of Nutrition, University of California and Dr. John M. Lampe, Chief, Health and Medical Services, Denver Public Schools. We are grateful, too, for the astute observations and insights of the teachers, athletic coaches, school nurses and administrators who have shared their first-hand knowledge with us.

The combined efforts of these professionals have produced a complete and definitive compendium of the published findings on the relationship between learning and nutrition.

In summary, these findings conclude that hungry children have been shown to exhibit behavioral changes which may limit their response to learning opportunities. Chronic undernutrition has also resulted in behavioral changes and impaired intellectual development.

To safeguard the health and well-being of the nation's children, school food service programs, such as the School Breakfast Program, were implemented to eliminate the hunger or undernutrition which could interfere with the learning process. Many schools have also instituted nutrition education programs in conjunction with their feeding programs, to give children the opportunity to learn the importance of the principles of good nutrition in their daily lives.

We hope that the information set forth on the following pages will prove useful and enlightening to you.

THE MEANING OF MALNUTRITION

To understand the complexity of the nutrition behavior-learning relationship, it is important to become familiar with the characteristic componerts of the relationship and their relative impact or significance. Once this understanding is achieved the related objectives of the national child nutrition programs are better understood.

Malnutrition is the state of impaired functional ability or development caused by an inadequate intake of essential nutrients or calories to provide for long term needs.[6]

Malnutrition can be subdivided into two major categories: severe malnutrition and moderate malnutrition. None of the foregoing conditions should be confused with the situation described as hunger. Malnutrition and hunger are not synonymous, although they are closely interrelated. Hunger and malnutrition and their respective effect on behavior and learning will be discussed separately.

SEVERE MALNUTRITION in children refers to infantile marasmus and kwashiorkor, each of which results from prolonged protein and/or calorie restriction in early childhood. Severe malnutrition is generally characterized by clinical manifestations often resulting in hospitalization.[6,11,12]

Severe malnutrition in young children is one of the most important nutrition problems facing the developing countries. For many children severe malnutrition inevitably will lead to premature death.[13,14] In the United States, severe malnutrition is not common and rarely is it the cause of death in children. Isolated cases of severe malnutrition in the U.S. do exist and instances have been reported among low-income groups in South Carolina,[15] Kentucky,[16] Louisiana,[17] and Colorado.[18] Indian Health Service Statistics and other surveys indicate that severe malnutrition in young children is a problem in many Native American populations.[19,20] Although the incidence of severe malnutrition in young Native American children has been declining, cases are still being reported.[19]

HOW MALNUTRITION AFFECTS BEHAVIOR

For those children who survive from severe malnutrition, the potential for achieving maximum growth and development may be limited. The extent of damage caused by nutritional deprivation depends on the severity, duration and time of onset.[6,21,22] Atten-

tion has been focused on the extent to which severe malnutrition early in life will influence behavior and learning ability.[5] One of the most obvious clinical manifestations of severe malnutrition in infancy is a dramatic combination of apathy and irritability.[10,23] During the time of severe malnutrition, children's ability to respond appropriately to significant stimuli in their environment is reduced. Once children have recovered, relatively normal responsiveness appears to be regained. The degree to which irresponsiveness during malnutrition affects subsequent intellectual functions is difficult to determine.

Cravioto and Robles found that infants tested during and after rehabilitation of severe malnutrition showed substantially reduced performance on developmental and cognitive tests.[4] Similar results were reported by Chase in Colorado who found that infants severely malnourished early in life performed consistently poorly when tested.[18] Evidence also suggests that reduced performance may persist for a period of years after rehabilitation from severe malnutrition.[21,24]

It appears that the more severe the nutritional deprivation in early childhood, the longer it continues without treatment, the greater is the likelihood of substantial intellectual impairment. Although the data is not entirely clear, evidence does suggest that severe malnutrition acquired later in childhood produces effects which are less marked and more amenable to rehabilitation.[25]

In general, there is reasonably good evidence accumulating to indicate that severe malnutrition early in life may have adverse effects on the intellectual development and behavior of children. Severe malnutrition never occurs in isolation. Environmental deprivation usually occurs simultaneously.[22,23,10,26,27] To date, research has not been able to conclusively isolate nutritional and environmental variables and evaluate their relative effects.

MODERATE MALNUTRITION OR CHRONIC UNDERNUTRITION is a state which exists when the quantity and/or quality of food intake is restricted. Chronic undernutrition generally results in growth retardation and increased susceptibility to infection and disease.[6]

Chronic undernutrition is more prevalent in the world than severe malnutrition. According to United Nations estimates, about 50% of all young children in the developing countries may be inadequately nourished.[28] The degree to which chronic undernutrition occurs in the U.S. today is not accurately known. However there is evidence indicating that chronic undernutrition is widespread, especially in low-income population groups.[10,29,30] The issue of widespread chronic undernutrition in the U.S. has been a matter of national

concern for many years and it is one of the problems to which the School Breakfast Program addresses itself and attempts to relieve.

UNDERNUTRITION IN THE U.S.

In December 1967, Congress directed the U.S. Department of Health, Education and Welfare to survey the magnitude and location of malnutrition and related health problems in the U.S.[31] In 1968 work began on the Ten-State Nutrition Survey which was conducted in Texas, Louisiana, New York, Kentucky, Michigan, California, Washington, South Carolina, West Virginia and Massachusetts.[29] Even though the results of the Ten-State Nutrition Survey vary from one locality to another, overall they do indicate that a significant proportion of the population surveyed was chronically undernourished or were at a high risk of developing nutrition-related health problems.[29]

Among the various age groups surveyed, adolescents ages 10 to 16 had the highest prevalence of unsatisfactory nutritional status with more evidence of chronic undernutrition among male adolescents than female.

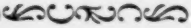
Evidence of retarded growth and development was generally more prevalent in the lower income groups. Data on blacks and whites also indicated the existence of a genetically-based difference in growth rates as well as a difference in nutritional factors effecting growth.

A high prevalence of low hemoglobin and hematocrit (volume of packed red blood cells) values was found throughout all segments of the population studied. The evaluation of iron intake data in relation to hemoglobin values showed a tendency for lower hemoglobin levels to be associated with lower dietary iron intakes. An unexpected finding was that many adolescent and adult males had low hemoglobin values suggesting that anemia may be an unappreciated problem among males.

From the Ten-State Nutrition Survey data on iron status and dietary intakes it is evident that iron deficiency (depletion of iron stores in the body) is a widespread nutritional problem.[29] Similar results have been found in other studies on iron status. An extensive study in rural Tennessee by Hutcheson indicated a high prevalence of anemia among children around one year old.[32] Of all children, up to age 6 studied, 20% were reported as having 'marginal' iron status. Anemia rates as high as 29% among preschool children have been reported from a child health center in Washington, D.C.[33] Other studies have indicated that incidences from 20 to 76 percent may be found among children in various U.S. population groups.[34,35,36] In

young children the incidence of iron deficiency reaches a peak in the second year of life and then declines in the later years. Iron deficiency anemia appears to be most prevalent among children from low-income families.[37]

Other studies on nutritional status of Americans also indicate that chronic undernutrition is widespread in the U.S., especially in disadvantaged communities.[30,38] In a study of preschool children in Mississippi, Owen and Kram found that children from low socio-economic families were smaller than more affluent children.[30] The diets of the smaller children were significantly lower in calories and some nutrients than the diets of the more affluent children. Dietary intakes of nutrients have been assessed in several studies and results indicate that many people have inadequate diets because of poor food choices and/or inadequate money to buy sufficient food.[38] Dietary data from the Ten-State Nutrition Survey showed that there were a substantial number of children and adolescents with calorie and iron intakes below the dietary standards.[29] In New York, Christakis found that in an economically depressed district 71% of the school children had inadequate diets.[39] His study also demonstrated that an increased risk of having an inadequate diet was associated with a family being on welfare. It had previously been documented that the adequacy of the diet is directly related to income levels.[29,40] Generally, there are increasing dietary inadequacies and nutritional deficiencies with decreasing income levels. Within ethnic groups, nutritional deficiencies are more prevalent in the low-income segments than in the high-income groups. In a study of nutritional status of teenagers, Huenemann found dietary intakes of all nutrients declined with socio-economic status.[41]



HOW CHRONIC UNDERNOURISHMENT AFFECTS BEHAVIOR

There are fewer studies on the effects of chronic undernutrition compared to severe malnutrition on behavior and learning and the data from these few studies is somewhat confusing. Children who are chronically undernourished exhibit a reduction in responsiveness and attentiveness. In addition the undernourished child is easily fatigued and unable to sustain prolonged physical or mental effort.[10] Improvement in nutritional status which always includes an adequate breakfast, is accompanied by improvement in these behaviors. Dr. George Briggs, founder of the Society for Nutrition Education attests

that "a good breakfast can result in better schoolwork, fewer sick reports, better attendance in class and many added social, physical and biological benefits."

A few studies in the developing countries suggest that chronically undernourished children tend to lag behind their well-nourished counterparts in intellectual development. In a Guatemalan village study of 6 to 11 year old children in which stature was used as an indicator of previous undernutrition, Cravioto and associates found that tall children tended to make fewer errors in performing tasks used as a measure of developmental course than shorter children.[42] Overall the shorter children lagged by two years behind their taller agemates in the competence which they exhibited in performing the tasks. A more recent study conducted by Cravioto in Mexico indicated that taller children could integrate information received from audio and visual stimuli better than shorter children of the same age.[43] This observation is particularly important since integrative ability is considered essential in the acquisition of primary reading skills. Monckeberg and coworkers reported that the I.Q. of moderately malnourished young children in the slums of Santiago, Chile, was lower than that of comparable adequately nourished children.[27] The problem of isolating environmental deprivation and nutritional deprivation was again pointed out, however, as it was also found that a substantial correlation existed between mothers' I.Q. and children's growth in height. This finding suggests that mothers' intellectual competence may well influence the adequacy of nutritional care and the stimulation of the child's environment.

Thus far, research suggests that the influence of chronic undernutrition on behavior and psychological development is much milder than that of severe malnutrition early in life.[6,10,44] As with severe malnutrition, chronic undernutrition never occurs as an isolated problem. The particular contribution of nutritional factors relative to the role played by coexisting social and environmental influences, is not clear.[10,26,45] It is believed that as the severity of the nutritional deprivation declines, the non-nutritional factors become increasingly important.[6]

DOES IRON DEFICIENCY AFFECT LEARNING?

Iron deficiency has already been discussed as one of the most common nutritional problems in the U.S.[6,29] Several studies have investigated the effects of iron deficiency and iron deficiency anemia on behavior and intellectual development in children. Sulzer and coworkers concluded from their investigation of Head Start preschool children that iron deficiency anemia may exert only weak effects on intellectual performance.[46] They noted that the younger

anemic children were apparently more susceptible to an adverse impact of iron deficiency on cognition. According to work by Webb, anemic students showed poorer composite performance on the Iowa Test of Basic Skills.[47] However, he speculates on causes other than iron deficiency anemia for the lower performance scores. In a subsequent study by Webb, anemic children showed more conduct disturbances in school, as rated by teachers, than non-anemic children.[48] Data concerning the effects of anemia on behavior and school performance reviewed by Read suggest that anemia is associated with a decrease in attentiveness and purposeful activity while there is an increase in irritability.[49] Also, anemic children exhibit a narrower attention span and less persistence than non-anemic children. There is no evidence, however, to suggest any sizeable effect of iron deficiency anemia on intelligence as measured by standard I.Q. tests. As with other forms of nutritional deprivation, the effects on behavior appear to be related to the severity of the iron deficiency anemia. Whatever the physiological explanation, if children's behavior is affected by iron deficiency and anemia, then their learning process is also probably affected.[6,49]

OBESITY AND ITS EFFECT ON BEHAVIOR

So far, the discussion of malnutrition and its effects on behavior and intellectual development has been confined to conditions resulting from inadequate dietary intakes of one or more nutrients, usually occurring with an inadequate intake of food. The existence of a plentiful and varied food supply in a community, however, does not insure nutritional well-being for all the community members. Some of the most common nutritional problems in the U.S. are problems of excess and/or imbalance of dietary constituents rather than a deficiency. One of the common nutritional problems related to dietary excess is obesity. Obesity refers to a condition of excessive body fat which usually is the result of a long term positive energy balance.[50] The term obesity should not be used synonymously with the term overweight, which refers to a body weight heavier than some appointed standard, regardless of whether the excess weight is attributable to fat or to bone and muscle tissue.

Obesity has been cited as the most widespread form of malnutrition in the United States today. Accurate data on the prevalence of obesity in children is not available. However, reports indicate that around 10% of the children in the U.S. are obese.[51] The obese child presents special and difficult problems. Extensive research has shown that obesity is associated with many other health problems.[52,53] Besides the well-documented association between obesity and dis-

ease, the emotional and psychological cost of being excessively fat is often substantial. The psychological problems are especially significant in societies such as the U.S. where body slimness is idolized. Whatever the causes of the obesity, the obese individual in our society is subject to social attitudes that tend to be uncomplimentary, contemptuous and censorious.[54] Obese individuals experience varying degrees of wretchedness and self-disdain and these feelings influence the way the individual perceives himself and his world.[55] Monello and Mayer found that obese adolescent girls perceived themselves as inferior to others.[56] They had internalized and accepted the moralistic attitudes of society toward themselves as obese individuals. The effects of obesity on learning and intellectual development has not been described. The self-concept of the obese child and its effects on intellectual performance is an area requiring investigation especially in view of the number of children suffering from this form of malnutrition.

LINKING OF HYPERACTIVITY AND FOOD ADDITIVES INVESTIGATED

Recently, increased attention has been focused on specific diseases causing behavior problems in children. In general terms, this group of diseases is known as hyperkinesis or hyperkinetic learning disability (HLD) and is closely related to the group of diseases classified as minimal brain dysfunction.[57] The cause of HLD is not known. However, interest has been directed toward specific food components as a causative factor. The interest in the relationship between food components and HLD were initiated by Dr. Ben Feingold, a California pediatric allergist. In his book, *WHY YOUR CHILD IS HYPERACTIVE*, Feingold suggests that HLD is associated with the ingestion of salicylates, salicylate-related substances and common food additives such as artificial flavors and colors.[58] Feingold points out that the chemical agents that he believes cause HLD do not produce allergic reactions in the usual sense, that is the body's reaction to these compounds does not involve the immunological system.[57] His theory is that some individuals may have a genetic predisposition to react to salicylates and synthetic colorings and flavorings which leads to altered behavior.

Feingold states that the incidence of HLD has been increasing over the past few years, a fact which he attributes to the increasing presence of food additives.[59] However, Feingold does not know how many cases of HLD presently exist or whether the apparent rise in incidence represents an actual increase or merely the result of more accurate diagnosis and reporting.

In 1971, Feingold treated four boys with HLD with his special elimination diet; supposedly free of salicylates, salicylate-related compounds, and artificial colorings and flavorings.[60] All boys showed marked behavior improvement while on the diet and when challenged with a 'forbidden food', the HLD behavior symptoms returned. Feingold states that he has had similar success with other children treated with the elimination diet but these cases have not been reported in detail.

To investigate Feingold's proposal, Connors performed a controlled study using Feingold's elimination diet on children with HLD.[61] The results of Connors' study are not at all conclusive. The results suggest that a diet free of most natural salicylates, artificial colors and flavors reduces the perceived hyperactivity of some HLD children. Because of the small sample size and inconsistent results the study is not conclusive and clearly indicates the need for further investigation.[62] Presently there are a number of research studies being carried out. They are investigating several aspects of dietary and environmental influences on behavior.

The influence of HLD on intellectual development is also an area requiring investigation. The Feingold theory relating specific dietary components to a disease state with behavioral changes draws attention to the possible existence of additional nutrition-related behavior problems.

THE EFFECTS OF HUNGER ON BEHAVIOR

HUNGER is a physiological and psychological state resulting when immediate food needs are not met.[6] The terms hunger and malnutrition cannot be used synonymously as they describe very different conditions. Hunger can be relieved quickly with food, whereas malnutrition requires extended rehabilitation and may have lasting effects. Although hunger and malnutrition are not identical they are closely interrelated. Clearly, a malnourished child may be hungry; however, a well-nourished child may also be hungry. Hunger is extremely difficult, if not impossible, to measure. Consequently, despite numerous studies that have documented the occurence of hunger in the U.S., the exact extent of the problem is not known.[29,38] Much evidence concerning the prevalence of hunger has consisted of subjective case reports. Most reports come from school teachers and administrators who can cite numerous examples of children arriving at school hungry.[63,64] Evidence concerning hunger from the Ten-State Nutrition Survey supports the subjective reports.[29] Hunger was found to be widespread in the low-income population groups studied in the survey.

Estimates suggest that up to one-quarter of American children may attend school without having eaten breakfast.[64] Among students from a New York junior high school, Dibble found that 41% of the children had arrived at school without having had breakfast.[65]

Scientific research concerning the influence of hunger on behavior and intellectual development has lagged behind the work on malnutrition. Hunger may influence learning by increasing a child's nervousness and irritability, thereby decreasing the child's interest and receptivity to learning experiences. The National Institute of Child Health and Human Development notes that "although hunger probably has neither direct effects on learning, nor permanent effects on behavior, it potentially disrupts the learning process. A hungry child's disinterest and inability to concentrate tend to isolate him, and when others respond negatively to his behavior, his isolation is heightened, creating a vicious circle. The child fails to learn for social and psychological rather than biological reasons."[66]

There are very few published scientific reports about hunger and school performance. However, school teachers and administrators frequently comment about the apathy, inability to pay attention, disruptive behavioral patterns and over-concern about food, seen in hungry children.[64,66,68,69] Conversely, after the implementation of a School Breakfast Program, school officials are quick to notice improved behavior patterns, including less absenteeism and tardiness and a greater interest in lessons.[67]

The effects of hunger on behavior in adults was clearly demonstrated by Keys using volunteers during World War II.[70] The starvation study results indicate a pattern of irritability, disinterest, apathy and other behavioral changes as hunger and then starvation were experienced. On refeeding, these behavioral patterns slowly reversed to the prestudy behavior.

THE INFLUENCE OF BREAKFAST ON LEARNING

A few studies evaluating the influence of school feeding programs on scholastic performance have been conducted. One of the most comprehensive and better known studies was the 1962 Iowa Breakfast Study.[71,72]

Results of the Iowa study indicate that according to teachers' assessment, the majority of boys in the study had a better attitude and better scholastic record during the period when breakfast was included in the daily dietary regimen than when breakfast was omitted. Variation in the size and content of the breakfast did not change the late morning work efficiency. Swedish investigators also found

that the content of the breakfast did not influence school performance except when the breakfast provided less than 400 calories, in which case performance was adversely affected.[73]

Dr. John M. Lampe, Executive Director of Health and Medical Services for Denver public schools, considers the morning meal "critical to optimal learning. If children do not have nutrients when they need them, they suffer."

Dr. Jean Craig, Principal, School #6, Yonkers, New York states, "The children who fell asleep because they lacked the breakfast fuel to keep them going are now alert interested pupils."

Compared with the lack of scientific data related to hunger, behavior and intellectual development, there are many subjective reports on this topic. Many school teachers attest to the fact that hungry children cannot concentrate as well as those who have eaten before arriving at school. A Wisconsin teacher's statement: "The child with breakfast is ready to do his work. He is a much happier and more active child," is typical of many teachers' comments. Children on breakfast programs are happier and less restless, say many other teachers. Another teacher cites the psychological well-being which students experience as a result of eating breakfast at school: "Aside from the importance of having warm, nutritious food served to them, the children begin the day happily and quietly."[74] Educators are also quick to point to the effects of breakfast on morning learning ability. As one teacher explains, "Breakfast is the most important meal for all children in that it is during the morning hours that basic educational subjects are usually taught. A mind occupied with thoughts of hunger can't be concerned with reading, writing or arithmetic."[75]

The beneficial effects of serving breakfast to hungry children have been reflected by improved behavior and attentiveness in the classroom as well as improved school attendance. The hungry child is apathetic, disinterested and incapable of coping with stress–all factors that may adversely influence the response of a child in a learning experience. According to Kallen, hunger leads to a decreased sense of worth. Thus the hungry child may also fail to learn for social and psychological reasons rather than impaired biological or neurological functions.[76]

SCHOOL FOOD SERVICE PROGRAMS COMBAT HUNGER

Well before scientific documentation of the suffering and tragic consequences of hunger and malnutrition in children, concerned citizens and organizations were striving to improve the well-being of deprived children. Intervention programs that were initiated in re-

sponse to public concern about child welfare had their beginning in Europe in the 1800's.[77] Charitable organizations and later schools took on the responsibility of feeding and clothing children of low-income families. The first school food service programs began operating in Germany and France in the early 1800's in an effort to combat child hunger in the cities. By 1890 the school food service movement had spread to America.[78] The first school lunch programs were organized by private societies and charitable organizations. In Philadelphia, the Starr Center Association began serving penny lunches to children in 1894. The beneficial effects of the lunch program on children was soon recognized by education authorities. Within a short time, the school lunch program was operating in many U.S. schools.

The Depression years of the 1930's deepened the public concern over hunger and nutritional deficiencies in school children. Many states and municipalities adopted legislation to enable schools to serve a midday meal to children. Many of the programs of this era had sound goals and were primarily concerned with children's nutritional needs.

Increased awareness about the beneficial effects of the school lunch program on child welfare heightened public support for permanent Federal aid for school lunch programs and on June 4, 1946, Congress responded by making the National School Lunch Act a law.[79]

In the 1960's there was renewed interest about children in disadvantaged communities. In response to the concern about educational opportunities and the welfare of children in low-income areas, Congress passed the Elementary and Secondary Education Act (ESEA) in 1965.[80] Title 1 of ESEA was directed toward helping local agencies broaden and strengthen education programs in schools with high concentrations of educationally deprived children. Many Title 1 projects used the ESEA funds to provide breakfast or to expand existing school food service programs.

SCHOOL BREAKFAST PROGRAM RESPONDS TO THE HUNGRY CHILDREN

The nutritional needs of economically deprived children was the basic concern that laid the foundation for the Child Nutrition Act of 1966.[81]

In submitting his proposal for the Child Nutrition Act, President Johnson stressed that no child in affluent America should be without an adequate diet and proposed the Act as a means of reaching that

goal. School teachers and administrators were expressing concern about children who continually arrived at school hungry. Provision of a school lunch was not helping the hungry children during the morning when restlessness, inattentiveness and general apathy hindered classroom activities and learning opportunities. Congress responded to the problem of the hungry child by creating the School Breakfast Program in 1966 as a part of the Child Nutrition Act. The Program was modeled after the School Lunch Program and was designed to 'safeguard the health and well-being of the nation's children.'[82] The Breakfast Program was first directed towards schools in low-income areas and in areas where children had to travel great distances to school. The general response from many schools about the School Breakfast Program is indicated in a statement by Representative Perkins: "Reports from literally dozens of schools that have started a breakfast program show tremendous enthusiasm for it—improved attendance records, improved behavior and alertness throughout the morning add testimony to the fact that this program is needed in many, many schools."[83]

The years from 1966 to 1968 were important years in the history of school food service programs. Many highly significant events took place including several nationwide surveys. One such survey investigated the food consumption of households in the U.S. and the results indicated that diets had deteriorated within the previous decade.[84] As a result of these findings, Orville Freeman, Secretary of Agriculture, directed that a nationwide nutrition education program be undertaken. The primary efforts of the nutrition education program were directed toward children and young families. Schools were expected to expand school food service programs, including initiation of breakfast programs.

The school food service programs under the National School Lunch Act and Child Nutrition Act continued to expand and reach more children. However, many children who arrive at school hungry are not being reached by the School Breakfast Program. The School Lunch Program reaches many more children than the breakfast program. In 1975 it was estimated that national participation in the School Breakfast Program was only 10% of the School Lunch Program.[85]

School food service programs contribute significantly to the nutritional needs of many children. Relieving hunger in the morning enables children to participate more actively in learning experiences in the classroom. However, providing food will not by itself alleviate the causes of hunger or nutritional inadequacies. Lack of awareness of nutritional needs and the inability to make wise food choices will not be remedied by providing meals. For children to acquire the knowledge that will enable them to establish sound eating habits, school food service programs need to be supported and coordinated with nutrition education. For the future well-being of children, the

cycle of ignorance, poverty and hunger must be broken by extensive use of the school food service programs and nutrition education programs coordinated through the school curriculum.

Many of the panels at the White House Conference on Food, Nutrition and Health stressed the need for improved nutrition education. The Nutrition Education in Elementary and Secondary Schools Panel stated: "This report recognizes both the urgency for immediate action to eliminate hunger and the need for a long-range program in nutrition education . . . Sound nutrition education should enable each individual, throughout his life, to make wise decisions about his food choices."[86]

Nutrition education can influence a positive change in eating habits and food choices. Head found that school children had an improved knowledge of nutrition as well as a significant improvement in diet following a school nutrition education program.[87] The study showed that the younger children had the most dramatic change in eating habits and nutrition knowledge. Plate waste from school lunch decreased significantly after the nutrition education program. In California, a pilot program in nutrition education showed plate waste could be lowered by 18 percent.[88] Alford and Tibbets found the consumption of vegetables by children, ages 6 to 17, was increased through a nutrition education program.[89]

Currently a Five-State Nutrition Education Project is underway in Alabama, Florida, Georgia, Mississippi and Tennessee.[90] The project includes activities to introduce students to new foods and increase food consumption. The overall goal of the project is to reduce food and beverage waste and increase nutrient intake.

The National Advisory Council on Child Nutrition recently recommended that funds be appropriated to the States for the purpose of conducting experimental or demonstration projects to teach school children the nutritional value of foods and the relationship of nutrition to human health.[91] In 1977, the Child Nutrition Act of 1966 was amended by adding a section on "Nutritional Education and Training." The Act states that Congress finds that:

(1) the proper nutrition of the Nation's children is a matter of highest priority;

(2) the lack of understanding of the principles of good nutrition and their relationship to health can contribute to a child's rejection of highly nutritious foods and consequent plate waste in school food service operations. . .

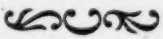
(3) parents exert a significant influence on children in the development of nutritional habits and lack of nutritional knowledge

on the part of parents can have detrimental effects on children's nutritional development; and

(4) there is a need to create opportunities for children to learn about the importance of the principles of good nutrition in their daily lives and how these principles are applied in the school cafeteria.

The purpose of the amendment is to encourage dissemination of information "to children participating or eligible to participate in the school lunch and related child nutrition programs by establishing a system of grants to State educational agencies for the development of comprehensive nutrition information and education programs. Such nutrition education programs shall fully use as a learning laboratory the school lunch and child nutrition programs."[9 2]

Health educators, teachers, administrators, school doctors, school nurses, school food service personnel and nutritionists are striving to improve the well-being of children through a team approach. With improved well-being it is hoped that the children's response to educational and environmental experiences will be improved with an eventual beneficial effect on learning and intellectual development.



REFERENCES

1. The Citizens' Board of Inquiry into Hunger and Malnutrition, "**HUNGER, U.S.A.**," Washington, D.C., New Community Press, 1968, p. 13.
2. The Citizens' Board of Inquiry into Hunger and Malnutrition, "**HUNGER, U.S.A.**," 1968, p. 1-100.
3. Columbia Broadcasting System, "**HUNGER IN AMERICA**," (Nationally televised 1 hour documentary, May 1968).
4. **Cravioto, J., and Robles, B., "EVOLUTION OF ADAPTIVE AND MOTOR BEHAVIOR DURING REHABILITATION FROM KWASHIORKOR,"** Amer. J. Orthopsychiatry, 35:449-464, 1965.
5. Winick, M., "**MALNUTRITION AND BRAIN DEVELOPMENT**," New York, Oxford University Press, 1976, p. 137
6. Read, M.S., "MALNUTRITION, HUNGER AND BEHAVIOR: 1. **MALNUTRITION AND LEARNING**," J. Amer. Diet. Assn., 63:379-385, 1973.
7. Pollitt, E., and Thomson, C., "**PROTEIN-CALORIE MALNUTRITION AND BEHAVIOR: A VIEW FROM PSYCHOLOGY**," in Wurtman, R.J. and Wurtman, J.J. (Eds.), Nutrition and the Brain, Vol. 2, New York, Raven Press, 1977, p. 272.
8. "**IF WE HAD HAM, WE COULD HAVE HAM AND EGGS . . . IF WE HAD EGGS**," The Food Research and Action Center, New York, Gazette Press, 1972, p. 30.
9. Ibid., p. 1.
10. Birch, H.G., "**MALNUTRITION, LEARNING, AND INTELLIGENCE**," Amer. J. Pub. Health, 62:773-784, 1972.
11. Winick, M., "**MALNUTRITION AND BRAIN DEVELOPMENT**," 1976, p. 4.
12. Pollitt, E., and Thomson, C., "**PROTEIN-CALORIE MALNUTRITION AND BEHAVIOR: A VIEW FROM PSYCHOLOGY**," 1977, p. 267.
13. Newberger, C.M., Newberger, E.H., and Harper, G.P., "**THE SOCIAL ECOLOGY OF MALNUTRITION IN CHILDHOOD**," in Lloyd-Still, J.D., (Ed.), Malnutrition and Intellectual Development, Massachusetts, Publishing Sciences Group, Inc., 1976, p. 162.
14. Williams, S.R., "**NUTRITION AND DIET THERAPY**," Saint Louis, The C.V. Mosby Company, 1977, p. 337.
15. Jones, R.E., and Schendel, H.E., "**NUTRITIONAL STATUS OF SELECTED NEGRO INFANTS IN GREENVILLE COUNTY, SOUTH CAROLINA**," Amer. J. Clin. Nutr., 18:407, 1966.

16. Diamond, I., and Vallbona, C., **"KWASHIORKOR IN A NORTH AMERICAN WHITE MALE,"** Pediatr., 25:248, 1960.

17. Henington, V.M., Caroe, E., Derbes. V., and Kennedy, B., **"KWASHIORKOR, REPORT OF FOUR CASES FROM LOUISIANA,"** Arch. Dermatol., 78:157, 1958.

18. Chase, H.P., and Martin, H.P., **"UNDERNUTRITION AND CHILD DEVELOPMENT,"** New Engl. J. Med., 282:933, 1970.

19. Carlile, W.K., Ger Olson, H., Gorman, J., McCraken, C., VanderWagen, R., and Connor, H., **"CONTEMPORARY NUTRITIONAL STATUS OF NORTH AMERICAN INDIAN CHILDREN,"** in Moore, W.M., Silverberg, M.M., and Read. M.S., (Eds.) Nutrition, Growth and Development of North American Indian Children, DHEW Publ. No. (NIH) 72-26, p. 58-61.

20. Van Duzen, J., Carter, J.P., Secondi, J., and Federspiel, C., **"PROTEIN AND CALORIE MALNUTRITION AMONG PRESCHOOL NAVAJO INDIAN CHILDREN,"** Amer. J. Clin. Nutr., 22:1362-1370, 1969.

21. Cravioto, J., and DeLicarde, E.R., "MENTAL PERFORMANCE IN SCHOOL AGE CHILDREN," Amer. J. Dis. Child., 120:404, 1970.

22. Chase, H.P., **"UNDERNUTRITION AND GROWTH AND DEVELOPMENT OF THE HUMAN BRAIN,"** in Lloyd-Still, J.D., (Ed.), Malnutrition and Intellectual Development, Massachusetts, Publishing Sciences Group, Inc., 1976, p. 35.

23. Pollitt, E., and Thomson, C., **"PROTEIN-CALORIE MALNUTRITION AND BEHAVIOR: A VIEW FROM PSYCHOLOGY,"** 1977, p. 269.

24. Hertzig, M.E., Birch, H.G., Richardson, S.A., and Tizard, J., **"INTELLECTUAL LEVELS OF SCHOOL CHILDREN SEVERELY MALNOURISHED DURING THE FIRST 2 YEARS OF LIFE,"** Pediatr., 49:814-824, 1972.

25. Winick, M., **"MALNUTRITION AND BRAIN DEVELOPMENT,"** 1976, p. 142.

26. Chase, H.P., **"UNDERNUTRITION AND GROWTH AND DEVELOPMENT OF THE HUMAN BRAIN,"** 1976, p. 13.

27. Monckeberg, F.E., **"NUTRITION AND BEHAVIOR: PRACTICAL PROBLEMS IN FIELD STUDIES IN AN URBAN COMMUNITY,"** in Kallen, D.J., (Ed.) Nutrition, Development and Social Behavior, DHEW Publ. No. (NIH) 73-242, pp. 107-119.

28. Food and Agriculture Organization of the United Nations, **"THE STATE OF FOOD AND AGRICULTURE,"** Rome, FAO, 1974, p. 107.

29. Ten-State Nutrition Survey, 1968-1970: Highlights, DHEW Publ. No. (HSM) 72-8134, pp. 1-12.

30. Owen, G.M., and Kram, K.M., "**NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN MISSISSIPPI: FOOD SOURCES OF NUTRIENTS IN THE DIETS**," J. Amer. Diet. Assn., 54:490-494, 1969.

31. Winick, M., "**MALNUTRITION AND BRAIN DEVELOPMENT**," 1976, p. 24.

32. Hutcheson, H.A., and Wright, N.H., "**GEORGIA'S FAMILY PLANNING PROGRAM**," Amer. J. Nurs. 68:332-335, 1968.

33. Guteluis, M.F , "**THE PROBLEM OF IRON DEFICIENCY ANEMIA IN PRESCHOOL NEGRO CHILDREN**," Amer. J. Publ. Health, 59:290, 1969.

34. Haughton, J.J., "**NUTRITIONAL ANEMIA OF INFANCY AND CHILDHOOD**," Amer. J. Publ. Health, 53:1121, 1963.

35. Filer, L.J. Jr., "**THE U.S.A. TODAY - IS IT FREE OF PUBLIC HEALTH NUTRITION PROBLEMS? : ANEMIA**," Amer. J. Publ. Health, 59:328, 1969.

36. Corbett, T.H., "**IRON DEFICIENCY ANEMIA IN A PUEBLO INDIAN VILLAGE**," J. Amer. Med. Assn., 205:186, 1968.

37. Owen, G.M., Nelson, C.E., and Garry, P.J., "**NUTRITIONAL STATUS OF PRESCHOOL CHILDREN: HEMOGLOBIN, HEMATOCRIT AND PLASMA IRON VALUES**," J. Pediatr., 76:761, 1970.

38. "**HUNGER AND MALNUTRITION IN GEORGIA, 1969**," Caster, W.O., (Ed.) Report No. 1 of the Inter-Institutional Committee on Nutrition, 1969, pp. 1-41.

39. Christakis, G., Miridjanian, A., Nath, L., Khurana, H.S., Cowell, C., Archer, M., Frank, O., Ziffer, H., Baker, H., and James, C., "**A NUTRITIONAL EPIDEMIOLOGIC INVESTIGATION OF 642 NEW YORK CITY CHILDREN**," Amer. J. Clin. Nutr., 21:107-126, 1968.

40. Birch, H.G., and Gussow, J.D., "**DISADVANTAGED CHILDREN: HEALTH, NUTRITION AND SCHOOL FAILURE**," New York, Grune and Stratton, Inc., 1972, p. 223.

41. Huenemann, R.L., Shapiro, L.R., Hampton, M.C., and Mitchell, B.W., "**FOOD AND EATING PRACTICES IN TEENAGERS**," J. Amer. Diet. Assn., 53:17-24, 1968.

42. Cravioto, J., DeLicardie, E.R., and Birch, H.G., "**NUTRITION, GROWTH AND NEUROINTEGRATIVE DEVELOPMENT: AN EXPERIMENTAL AND ECOLOGICAL STUDY**," Pediatr., 38:319-372, 1966.

43. Cravioto, J., Espinoza, C.G., and Birch, H.G., "**EARLY MALNUTRITION AND AUDITORY-VISUAL INTEGRATION IN SCHOOL AGE CHILDREN**," J. Spec. Ed., 2:75-82, 1967.

44. Winick, M., "**MALNUTRITION AND BRAIN DEVELOPMENT**," 1976, p. 142.

45. Ibid., p. 128.

46. Sulzer, J.L., Wesley, H.H., and Leonig, F., "**NUTRITION AND BEHAVIOR IN HEAD START CHILDREN: RESULTS FROM THE TULANE STUDY**," in Kallen, D.J., (Ed.), Nutrition, Development and Social Behavior, DHEW Publ. No. 73-242, 1973., p. 100.

47. Webb, T.E., and Oski, F.A., **"IRON DEFICIENCY ANEMIA AND SCHOLASTIC ACHIEVEMENT IN YOUNG ADOLESCENTS,"** J. Pediatr., 82:827. 1973.

48. Webb, T.E., and Oski, F.A., **"BEHAVIORAL STATUS OF YOUNG ADOLESCENTS WITH IRON DEFICIENCY ANEMIA,"** J. Spec. Ed., 8:153, 1974.

49. Read, M.S., **"ANEMIA AND BEHAVIOR,"** Mod. Probl. Pediatr., 14:189-202, 1974.

50. Gifft, H.H., Washbon, M.B., and Harrison, G.G., **"NUTRITION, BEHAVIOR AND CHANGE,"** New Jersey, Prentice-Hall, Inc., 1972, P. 149.

51. Winick, M., **"CHILDHOOD OBESITY,"** Nutr. Today, 9:6, 1974.

52. Marks, H.H., **"RELATIONSHIP OF BODY WEIGHT TO MORTALITY OR MORBIDITY,"** Metab., 6:417, 1957.

53. Wilson, R.H.S., and Wilson, N.L., **"OBESITY AND RESPIRATORY STRESS,"** J. Amer. Diet. Assn., 55:465, 1969.

54. Gifft, H.H., Washbon, M.B., and Harrison, G.G., **"NUTRITION, BEHAVIOR AND CHANGE,"** 1972, p. 154.

55. Mayer, J., **"OVERWEIGHT: CAUSESS, COST, CONTROL,"** New Jersey, Prentice-Hall, Inc., 1968.

56. Monello, L.F., and Mayer, J., **"OBESE ADOLESCENT GIRLS, AN UNRECOGNIZED 'MINORITY' GROUP?"** Amer. J. Clin. Nutr., 13:35, 1963.

57. Margen, S., Current Topics, J. Nutr. Ed., 7:79-81, 1975.

58. Feingold, B.F., **"WHY YOUR CHILD IS HYPERACTIVE,"** New York, Random House, 1975.

59. Feingold, B.F., **"WHY YOUR CHILD IS HYPERACTIVE,"** 1975, p. 53.

60. Feingold, B.F., **"WHY YOUR CHILD IS HYPERACTIVE,"** 1975, p. 22.

61. Connors, C.K., Goyette, C.H., Southwick, D.A., Lees, J.M. and Andrulonis, P.A., **"FOOD ADDITIVES AND HYPERKINESIS: A CONTROLLED DOUBLE BLIND EXPERIMENT,"** Pediatr., 58:154-166, 1976.

62. Levine, M.D., and Linden, C.B., **"FOOD FOR INEFFICIENT THOUGHT,"** Pediatr., 58:145-148, 1976.

63. If We Had Ham, We Could Have Ham and Eggs . . . If We Had Eggs, 1972, p. 31.

64. Read, M.S., **"NUTRITION, ENVIRONMENT AND CHILD BEHAVIOR,"** in Serban, G., (Ed.), Nutrition and Mental Functions, New York, Plenum Press, 1975, p. 195.

65. Dibble, M., Brin. M., McMullen, E., Peel, A., and Chen, N., **"SOME PRELIMINARY BIOCHEMICAL FINDINGS IN JUNIOR HIGH SCHOOL CHILDREN IN SYRACUSE AND ONONDAGA COUNTY, NEW YORK,"** Amer. J. Clin. Nutr., 17:218-239, 1965.

66. Read, Merill, Malnutrition, Learning and Behavior, National Institute of Child Health and Human Development, Center for Research for Mothers and Children, DHEW Publ. No. (NIH) 76-1036, 1976, p. 19,25.

67. If We Had Ham, We Could Have Ham and Eggs . . . If We Had Eggs. A study of the National School Breakfast Program, prepared by the Food Research and Action Center, New York, N.Y., 1972, p. 32-47.

68. Gifft, H.H., Washbon, M.B., and Harrison, G.G., **"NUTRITION, BEHAVIOR AND CHANGE,"** 1972, p. 174.

69. If We Had Ham, We Could Have Ham and Eggs . . . If We Had Eggs, 1972, p. 29.
70. Keys, A., Brozek, J., Henschel, A., Mickelsen, O., and Taylor, H.L., **"THE BIOLOGY OF HUMAN STARVATION,"** Vol. 11, Minneapolis, University of Minneapolis Press, 1950.
71. Tuttle, W.W., Daum, K., Larsen, R., Salzano, J., and Roloff, L., **"EFFECT ON SCHOOL BOYS OF OMITTING BREAKFAST: PHYSIOLOGIC RESPONSE, ATTITUDES AND SCHOLASTIC ATTAINMENTS,"** J. Amer. Diet Assn., 30:674, 1954.
72. A Complete Summary of the Iowa Breakfast Studies, Chicago, Cereal Institute, 1962.
73. Arvedson, I., Sterky, G., and Tjernstrom, K., **"BREAKFAST HABITS OF SWEDISH SCHOOL CHILDREN,"** J. Amer. Diet Assn., 55:257,1969.
74. Erma Rimmel, Denver Public Schools.
75. Walter B. Oliver, Denver Public Schools.
76. Kallen, D.J., **"NUTRITION AND SOCIETY,"** J. Amer. Med Assn., 215:24, 1971.
77. The National School Lunch Program: Background and Development, Food and Nutrition Service, U.S.D.A., U.S. Government Printing Office, 1971, p. 1-4.
78. Ibid., p. 4.
79. Education in the States: Nationwide Development Since 1900, Nutrition Education Association of the United States. 1971, p. 566.
80. Ibid., p. 580.
81. Ibid., p. 580.
82. If We had Ham, We Could Have Ham and Eggs . . . If We Had Eggs, 1972, p. 1.
83. Ibid., p. 6.
84. Education in the States: Nationwide Development Since 1900, 1971, p. 582.
85. School Food Program Needs–1975, Select Committee on Nutrition and Human Needs, United States Senate, U.S. Government Printing Office, Washington, April, 1975, p. 209.
86. Livingston, S.K., **"WHAT INFLUENCES MALNUTRITION,"** J. Nutr. Ed., 3(1):18-27, 1971.
87. Head, M.K., **"A NUTRITION EDUCATION PROGRAM AT THREE GRADE LEVELS,"** J. Nutr. Ed., 6(2):56-59, 1974.
88. Ullrich, H.D., Testifying on Behalf of, The Nutrition Education Section of S 1420 National School Lunch Act and Child Nutrition Act of 1966, Amendments of 1977, May 5, 1977.
89. Alford, B.B., and Tibbets, M.H., **"EDUCATION INCREASES CONSUMPTION OF VEGETABLES BY CHILDREN,"** J. Nutr. Ed., 3(1):12-13, 1971.
90. National Advisory Council on Child Nutrition, 1976 Annual Report, U.S. Government Printing Office, 241-435, FNS-187, August 1977, p. 4.
91. Ibid., p. 12.
92. National School Lunch and Child Nutrition Amendments of 1977, 95th Congress 1st. Session, Senate Report No. 95-504, October 19, 1977, p. 18.

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